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Federal Geographic Data Committee (FGDC) and Development of National Geospatial Standards (NGS)

by Katherine Kershner, U.S. Army Topographic Engineering Center

One of the effects of the explosion in information technology and the demand for geospatial information has been duplicate data production within Federal agencies and businesses. In today's environment of downsizing and Federal budget reduction, duplicate data production and attribution using different methodologies and schemas are very expensive and inefficient. The Federal Geographic Data Committee (FGDC) is an interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis.

The FGDC was established by the Office of Management and Budget (OMB) in its 1990 revision of Circular A-16. Executive Order 12906 promotes the standardization of Federal spatial data collection efforts by establishing the National Spatial Data Infrastructure (NSDI). The NSDI will provide a base or structure of relationships between data producers and users that will facilitate data sharing. The FGDC comprises 14-plus subcommittees and working groups whose focus is on developing geospatial standards employing different methodologies to achieve these goals. The FGDC program ensures that standards are created under an open consensus, with participation by non-Federal and Federal communities, and that all standards from the FGDC subcommittees and working groups are integrated. They are developed through a structured process to ensure they are supportable by the vendor community and are independent of specific technologies.

The subcommittees and working groups consist of members from Federal, state, local, tribal, private, academic, and internal communities. The thematic subcommittees are responsible for creating the standards. Representatives from the individual subcommittees/working groups comprise the Standards Working Group (SWG), whose role is to provide guidance on standards development policy and procedures and to coordinate projects within the FGDC and between the FGDC and other standards bodies. They review and approve all proposals for compliance to FGDC policy and procedures.

(Continued on page 2)

Inside this edition . . .

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The FGDC has developed a Standards Reference Model to define the expectations of FGDC standards, explain types of geospatial standards, and document the standards development process. Additional directives give guidance documenting the specific procedures within the standards development process. Standards development occurs in a five-stage, 12-step process from the initial standard proposal through FGDC adoption (Table 1). The FGDC has adopted these steps from those used in American National Standards Institute (ANSI) and International Organization for Standardization (ISO) processes. Standards maintenance is not included in the standards development process.

Table 1. Standards Development

Stage	Step
Proposal	1. Develop Proposal 2. Review Proposal
Project	3. Set up Project
Draft	4. Produce Working Draft 5. Review Working Draft
Review	6. Review and Evaluate Committee Draft 7. Approve Standard for Public Review 8. Coordinate Public Review 9. Respond to Public Comments 10. Evaluate Responsiveness to Public 11. Approve Standard for Endorsement Comments
Final	12. Endorsement

Geographic information systems (GIS) have become more powerful and affordable and have resulted in an explosion of GIS users in all walks of life. The need for standards development in the geospatial community has grown over the years as the demand for spatial data increases in local, state, and Federal government as well as business, academic, and international communities. It is the goal of the FGDC to create and adopt standards that will aid in the transferability of geospatial data. To date, the FGDC has formally endorsed the *Spatial Data Transfer Standard (SDTS)*, *Content Standard for Digital Geospatial Metadata*, *Cadastral Data Content Standards,* and *Classification of Wetlands and Deepwater Habitats of the United States*.

The Tri-Service CADD/GIS Center, which developed the Tri-Service Spatial Data Standard (TSSDS), is working very closely with the FGDC to help develop and maintain standards that are universal to the geospatial community. The Center participation with the multi-agency FGDC organization provides a vehicle for national acceptance and implementation of the TSSDS and related standards activities. In turn, the FGDC is utilizing the Center's expertise in standards software applications by funding an interactive browser registry for all FGDC standards.

Table 2 lists the subcommittees, the status of their standards development status, and their Web-site addresses, if available.

More information about the FGDC and individual standards development can be found through the FGDC home page at ***http://www.fgdc.gov***.

The Tri-Service Center is dedicated to fostering the application of computer-aided design and drafting (CADD) and geographic information system (GIS) technologies for facility life-cycle efforts throughout the Army, Navy, and Air Force. The CADD/GIS Bulletin *is published by the Tri-Service CADD/GIS Technology Center of the Information Technology Laboratory, U.S. Army Engineer Waterways Experiment Station, 3909 Halls Ferry Road, Vicksburg, Mississippi 39180-6199.*

Table 2.
Standards-Development Subcommittees / Working Groups and Status of Standards Development

Subcommittee	Standard(s)	Status	Further Information
Base Cartographic Data: fundamental set of geographic data produced in the preparation of national series general purpose graphic and digital cartographic products	Geospatial Positioning Accuracy Standard Standards for Digital Ortho-Imagery Standards for Digital Elevation Data	Step 8 - Coordinate Public Review Step 8 - Coordinate Public Review Step 8 - Coordinate Public Review	*http://www.fgdc.gov/Sbcd/sbcd.html*
Bathymetric: measurement of the depth of water referenced to a common datum	Geospatial Positioning Accuracy Standard, Navigation Charts, and Hydrographic Surveys	Step 1 - Develop Proposal	*http://wave.nos.noaa.gov/ocs/text/bathy/html*
Cadastral: land ownership information at all levels of government and the private sector	Cadastral Data Content Standard Geospatial Positioning Accuracy Standard, Cadastral and Boundary Survey and Plats	Step 12 - Endorsement Step 1 - Develop Proposal	*http://www.fgdc.gov.Cad/cadhome.html*
Cultural and Demographic Data: information about people and institutions in the U.S. And its territories	Content Standard for Cultural and Demographic Metadata Address Content Standard	Step 5 - Review Working Draft Step 4 - Produce Working Draft	*http://www.census.gov/ftp/pub/geo/www/standards/scdd*
Federal Geodetic Control: reference systems for establishing control for horizontal, vertical, and gravity measurements	Geospatial Positioning Accuracy Standards, Geodetic Network Point Profile for SDTS	Step 6 - Review and Evaluate Committee Draft Step 8 - Coordinate for Public Review	*http://www.ngs.noaa.gov/FGCS/fgcs.html*
Geologic: graphically referenced data pertaining to the origin, history, composition, and structure of the solid earth, both onshore and offshore, and the processes that act on and within the earth's surface	Cartographic and Digital Standard of Geologic Map Information	Step 1 - Develop Proposal	John Morton (703) 648-6509
Ground Transportation: public transportation systems that support the conveyance of people and goods from place to place at ground level including highways, railroads, and navigable inland and intercoastal waterways	Transportation Network Profile - SDTS Specifications for Encoding a Linear Referencing System Transportation Related Spatial Feature Dictionary	Step 5 - Review Working Draft Step 5 - Review Working Draft Step 5 - Review Working Draft	*http://www.bts/gov/gis/fgdc*
International Boundaries and Sovereignty: facilitate the exchange of international boundary and sovereignty data and guidance within the Federal Government	Digital Internal Boundaries Database	Step 5 - Review Working Draft	Brad Thomas (202) 647-2250
Soils: monitors the types of soil data collected and coding schemes used	Soils Geographic Data Standard	Step 8 - Coordinate Public Review	*http://www.nhq.nrcs.usda.gov/SDS/hmpage.htm*
Vegetation: coordinates vegetative data activities	Vegetation Classification Standard	Step 9 - Respond to Public Comments	*http://www.nbs.gov/fgdc.veg*
Wetlands: provides specific ecological and hydrological information for the identification, classification, and mapping of wetlands in the U.S. And its territories	Classifications of Wetlands and Deepwater Habitats of the United States	Step 12 - Endorsement	*http://www.nwi.fws.gov/fgdcwet.html*

(Continued)

Table 2. (Concluded)			
Working Groups	**Standard(s)**	**Status**	**Further Information**
Clearinghouse: to provide access to digital spatial data through metadata			*http://www.fgdc.gov/clearinghouse*
Earth Cover: responsible for integrating, standardizing, and establishing land cover classifications for the U.S.	Earth Cover Classification Standard	Step 1 - Develop Proposal	*http://www.fgdc.gov/Ecwg/ecwg.htm*
Standards: promotes and coordinates FGDC standards activities	Metadata Standard for Biological Resources Data	Step 1 - Develop Proposal	*http://www.fgdc.gov/SWG/swg.html*
Facilities: those entities with location which is deliberately established as a site for designated activities (factory, military base, college, hospital, power plant, etc.)	Geospatial Positioning Accuracy Standard, Engineering Construction and Facilities Management	Step 6 - Review and Evaluate Committee Draft	*http://corps_geo1.usace.army.mil/FGDC*
	Facility Identification (ID) Code	Step 4 - Produce Working Draft	
	CADD Profile for SDTS	Step 4 - Produce Working Draft	
	Environment Hazards Geospatial Data Content Standard	Step 1 - Develop Proposal	
	Utilities Geospatial Data Content Standard	Step 4 - Produce Working Draft	

The Federal Geographic Data Committee Facilities Working Group

by Nancy Blyler, Headquarters, U.S. Army Corps of Engineers

Since installation/civil works facility management can involve processing and integrating high- and low-resolution data and large- and small-scale data, the tri-service and civil works organizations require a very detailed, standardized database structure. These DoD-specific needs are being met on a national level through the Facilities Working Group of the Federal Geographic Data Committee. Created in January 1995, the Facilities Working Group (FWG) meets bimonthly to address data issues that will enhance facility management. A facility is an entity with location, deliberately established as a site for designated activities. A facility database might describe a factory, military base, college, hospital, power plant, fishery, national park, office building, space command center, or prison. Through its project teams, the FWG is developing national standards that address specific facility management data issues (see Table 2).

The FWG is pursuing the development of a Facility Identification (ID) Code Standard. Unique nonintelligent identifiers would coexist with agencies' internal codes and would initially be applied to Federal buildings. A utilities standard is being developed based on the Tri-Service CADD/GIS Spatial Data Standards (TSSDS). The utilities standard will be released for public review through the FGDC later this year. An environmental hazard standard is being developed that will combine the TSSDS environmental hazard information with the appropriate Environmental Protection Agency (EPA) environmental hazard data standards. The FWG has also developed a draft accuracy standard for architectural/engineering/construction (A/E/C) facility mapping.

Additional benefits of the Facilities Working Group are the linkages between the FGDC and other standards organizations such as recognizes its opportunity to be a link between the FGDC and the National Institute for Building Sciences (NIBS) and the American Public Works Association (APWA), and the National Institute of Standards and Technology (NIST).

The FWG is chaired by Mr. M.K. Miles from Headquarters, U.S. Army Corps of Engineers, and is composed of federal and state agencies as well as representatives from the private sector. For more information, please visit the FWG web page at ***http://corps_geo1.usace.army.mil/FGDC/welcome.html*** or contact Ms. Nancy Blyler at (202)761-8893.

On the Lighter Side.....

Calling Metadata

by Rose Kress, U.S. Army Engineer Waterways Experiment Station

RING! RING!

Laura: Hello, you have reached Fort Little Mamau. This is Laura.

Rose: Hi, Laura, this is Rose.

Laura: Hey, good to hear from you. What's up?

Rose: We're starting a new project, and I need a road file for Fort Little Mamau. Do you have one?

Laura: Yes, we have one around here someplace.

Rose: Great! Tell me about it.

Laura: Well, a contractor built it for us about 6 months ago, but we haven't really been using it. What do you want to know?

Rose: Well, how old is the road information, and where did they get it? Does it have tank tracks in it? Is one of the attributes surface type? Is it in State Plane coordinates or UTMs?

Laura: Whoa! Slow down! It will take me a while to track down all that. I know where the contractor's report is, but I seem to remember it's not very complete.

Rose: Didn't the contractor send you the metadata with that road file?

Laura: The meta what?

Rose: You know, the separate text file with all the background documentation about the digital road file. The metadata. All the stuff like where they got the road information and how old it is; what attributes the roads in the file have and how accurate the mapping is.

Laura: That's all in the data report somewhere, not in a separate file.

Rose: You should start keeping these metadata files for all the digital data at your installation. They are really a great help. Everything you need to know about the digital data and where it came from is listed in the metadata file so you don't have to plow through a bunch of boring reports. And you can keep all the really important data documentation together right there on your computer with the data.

Laura: That sounds like a good idea. Last week my boss wanted to know how old the information in our vegetation cover file was and if it had been mapped from aerial photographs. That file was built before I came here, and Joe was on vacation. It took me an hour just to find the report that went with the file. Then the report was not well organized, and it took me another hour to find the date of the aerial photography used to do the mapping. It was buried in Appendix D.

Rose: That's happened to me so many times I finally got tired of it. Now we've started requiring contractors to provide metadata files when they deliver the digital data. It's so much easier to answer questions about our data. Of course, we still get the written report for the supervisors to read. But the metadata has just the important stuff about the digital file itself and the data in the file. We have found that this format for documenting the data saves a lot of time and frustration. It makes it easier for us to share data, too.

Laura: We have a lot of digital data done by about a dozen different contractors, and every report is different. Some of them are pretty good, with a lot of detail, and some of them are pretty bad. They are scattered around the building in different places, too. I hope Joe has the report that came with the road data in his office.

Rose: Metadata helps those problems, too. There is a standard list of all the things that are supposed to be documented about the data file. So it doesn't matter who collected the data or built the digital file, the metadata files all include the same information and look pretty much alike. It helps the contractors too because they know exactly what information to report about the digital data. I like having the data specs on the computer in a text file so I don't have to go looking for reports.

Laura: OK, OK. I knew there had to be a better way. This sounds too good. What's the catch?

Rose: The catch is we are all supposed to be using metadata whether we want to or not. There was an Executive Order issued 3 years ago telling all Federal agencies to document data the metadata way.

Laura: All right. If you can do it, I can do it. Send me a couple of metadata files so I can see what they look like, and I will look for that road file report. In the meantime, I'll go ahead and send you the road file. All we have are Microstation design files. Can you use that?

Rose: Sure, I have to convert it to an ArcInfo coverage anyway.

Laura: What? You can do that! . . .

What Laura and Rose are talking about is the way digital geospatial data are documented. Geospatial is the fancy word for all the data in computer-aided design and drafting (CADD) and geographic information system (GIS) databases that record the location and descriptions of natural terrain and man-made features at the installation — the road file, the soil file, the vegetation file, elevation, cultural resources, endangered species, fences, firebreaks, restricted areas, pipelines, storage tanks - plus all the database (attribute) files that go with them.

All these data are (hopefully) documented somewhere. The documentation may be in a technical report. It may be loose papers in a file folder. It may be handwritten project notes, or simply information stored in someone's memory (the file cabinet of last resort).

Everyone knows this documentation is important. It is the permanent record of where the geospatial data came from, how they were collected, how old they are, how accurate they are, and what coordinate system and datum are used. It also defines all the attributes and map codes. Only it never seems to be available when it is needed, and every set of documentation is different.

That is where metadata comes in. The metadata Rose and Laura are talking about is simply a formal protocol for the written documentation of geospatial data. It is a standard reporting format used to organize all the documentation in data reports and file folders. Laura can e-mail the metadata (an ASCII text file) to Rose. The metadata contains enough detail about the road file for Rose to decide if this file is really what she needs. If she does want it, then Laura can arrange to transfer the actual road file. If not, Rose took only a few minutes of Laura's time.

The Federal Geographic Data Committee (FGDC) has issued a standard that lists what properties of geospatial data should be documented by the corresponding metadata. This is the "Content Standard for Digital Geospatial Metadata." Most of the properties listed in this standard are things people need to know to understand and have confidence in the geospatial data they are using. Other properties listed in the standard are intended to lead the user toward the age of universal electronic data exchange (like the World Wide Web address where the data may be accessed and keywords used in on-line data searches.)

Like any big government standard, the Metadata Standard in its original published form can be intimidating. It contains many words that may be unfamiliar to the first-time user. This should not be a cause for concern, however, because several practical language translations of the standard are available. A good place to get some basic help about metadata is the "Geospatial Data Documentation Support Package" included with Release 1.6 of the Tri-Service GIS Spatial Data Standard. Also, the Corps of Engineers has recently released a Windows95-based utility to guide the development of metadata that meets the FGDC standard. This utility, CorpsMet95, is available at ***http://corps_geo1.usace.army.mil.***

Metadata has been the topic of much discussion lately, especially among installation managers, GIS practitioners, and data development contractors. As always, knowledge can combat fear. Once the user understands what metadata really is (and what it is not), it begins to sound like a good thing.

What can you do now? The most practical thing to do to get started on your metadata journey is to begin requiring FGDC compliant metadata as a deliverable in all contracts that have digital geospatial metadata as a product. At the time of data development, all the things that go in the metadata file are close at hand, and it is a relatively minor task to generate the separate metadata file in text format. It is not a time-consuming or difficult task that will cost a lot of money.

RING! RING!

Rose: Hello, you have reached Fort Big Mamau. This is Rose.

Laura: Hey, Rose this is Laura.

Rose: Look, thanks for that road file. It worked out fine!

Laura: You're welcome. Now you can return the favor. Don't you have a file showing endangered species habitat at Fort Big Mamau?

Rose: Sure do. We just received it from the contractor.

Laura: Does it include habitat for the purple spotted bluebelly and the green stripped ladyluck?

Rose: Gee, Laura I just load and unload data. Never heard of that stuff. Let me e-mail you the metadata, and you see if you want to use the file we have.

Laura: OK. By the way, tell me about that Microstation to ArcInfo thing again. . . .

Well, that's another story.

Join the National Spatial Data Infrastructure (NSDI) Clearinghouse

by Laurel Gorman

The Federal Geographic Data Committee (FGDC) has organized a decentralized system of servers located on the Internet that provides access to digital spatial data through metadata documentation. The Clearinghouse, a component of the NSDI, functions as a detailed catalog service with support to spatial data and browse graphics. The development of the FGDC-sponsored Clearinghouse was motivated by a desire to minimize duplication of effort in the collection of expensive digital spatial data and to foster cooperative digital data collection activities. For further information on finding, obtaining, and viewing geospatial data holdings, visit the NSDI Homepage at ***http://nsdi.usgs.gov/nsdi*** and the FGDC Clearinghouse Information Homepage at ***http://www.fgdc.gov/clearinghouse/index.html***.

Key FGDC-Related Websites

Speciality	Name	URL
FGDC main page	FGDC Homepage	*www.fgdc.gov/fgdc2.html*
NSDI general information	USGS node of the NSDI	*nsdi.usgs.gov/nsdi*
Clearinghouse information and resources	Geospatial Data Clearinghouse activity	*www.fgdc.gov/clearinghouse/index.html*
Standards activities	List and status of FGDC Standards	*www.fgdc.gov/SWG/swgstat.html*
Guidelines and Executive Order documents	FGDC public documents online	*www.fgdc.gov/linkpub.html*
Coordination of TSSDS with FGDC Standards process	FSDC Facilities Working Group	*corps_geo1.usace.army.mil/fgdc*
Pointers to all FGDC Groups and Subcommittees	Tri-Service FGDC participation project	*fwgcom.wes.army.mil/fgdc*

Calendar of Events

Date	Event
	Organizational Meeting
January 29	Executive Steering Group, Vicksburg, MS, POC: Dave Horner, (601) 634-3106, hornerd3@ex1.wes.army.mil
	Training
December 13–15	AutoCAD/MicroStation Translation Workshop, Vicksburg, MS, POC: Elias Arredondo, (601) 634-3140, arredoe@ex1.wes.army.mil
March 30–April 3 September 14–18	GPS/GIS Applications and Conversion Course, Vicksburg, MS, March class full; however, potential vacancies for September class, POC: Marsha Samples, (205) 895-7449
	Conferences of Interest
March 30–April 4	1998 ASPRS-RTI Annual Conference, Tampa, FL, ATTN: ASPRS, (301) 493-0290, asprs@asprs.org, http://www.asprs.org/asprs
April 26–29	AM/FM International Annual Conference XXI, San Jose, CA, ATTN: AM/FM International, (303) 337-0513, staff@amfmintl.org, http://www.amfmintl.org
	Publications
January	Spatial Data Standards, Release 1.75, POC: Bobby Carpenter, (601) 634-4572, carpenb@ex1.wes.army.mil
Current	Tri-Service Spatial Data Standards ARC/INFO Technical Implementation Guide, Final Draft, POC: Bobby Carpenter, (601) 634-4572, carpenb@ex1.wes.army.mil
Current	Tri-Service Spatial Data Standards ArcView Technical Implementation Guide, Final Draft, POC: Bobby Carpenter, (601) 634-4572, carpenb@ex1.wes.army.mil
Current	Tri-Service Spatial Data Standards MGE Technical Implementation Guide, Final Draft, POC: Bobby Carpenter, (601) 634-4572, carpenb@ex1.wes.army.mil
Current	Guidelines for the Use of Remotely Sensed Data, POC: Laurel Gorman, (601) 634-4484, gormanl@ex1.wes.army.mil
Current	Cost/Benefit Analysis on the use of Remotely Sensed Data with GIS Applications, Final Draft, POC: Laurel Gorman, (601) 634-4484, gormanl@ex1,wes.army.mil
Current	EDMS Survey, POC: Laurel Gorman, (601) 634-4484, gormanl@ex1.wes.army.mil